61A Lecture 32

Announcements

Declarative Languages

Database Management Systems

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A **table** has columns and rows

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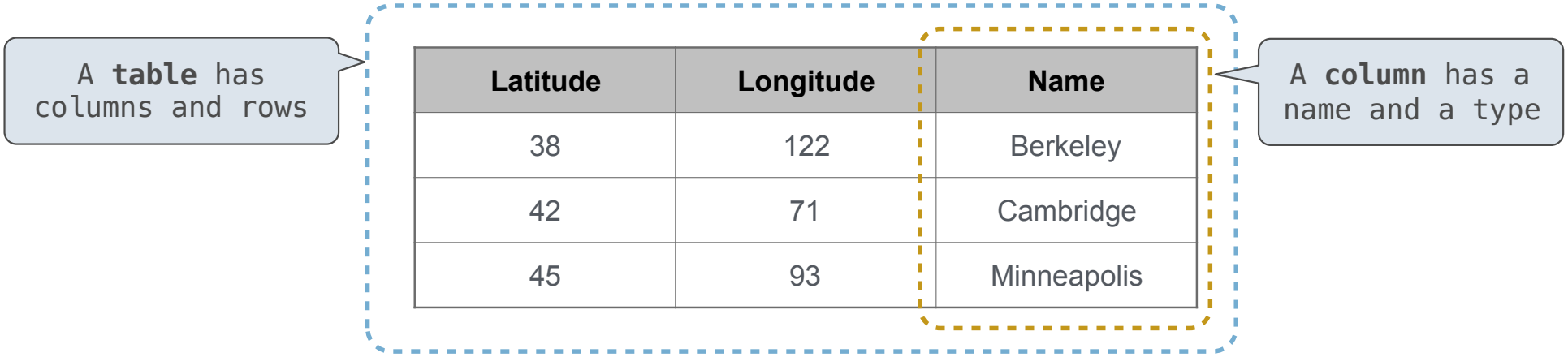

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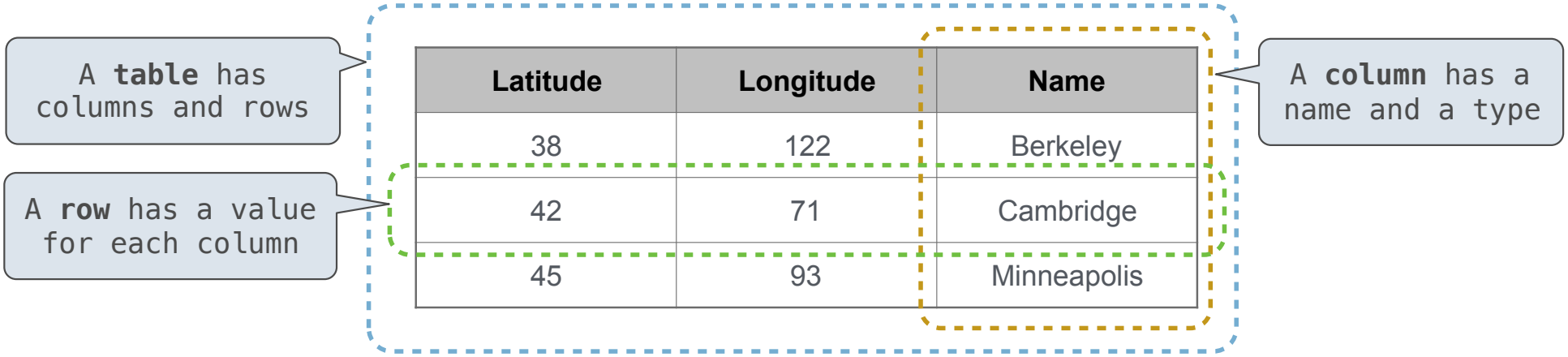

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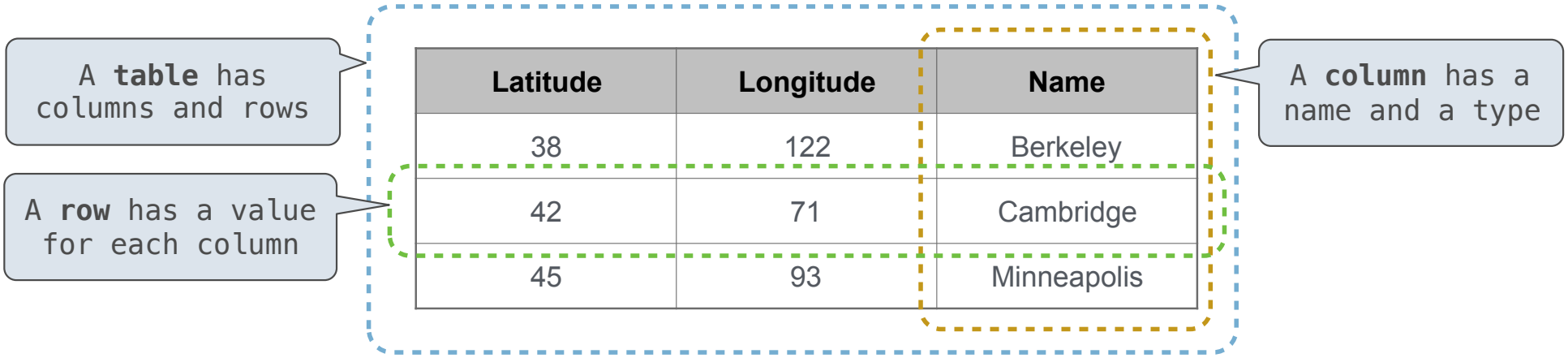

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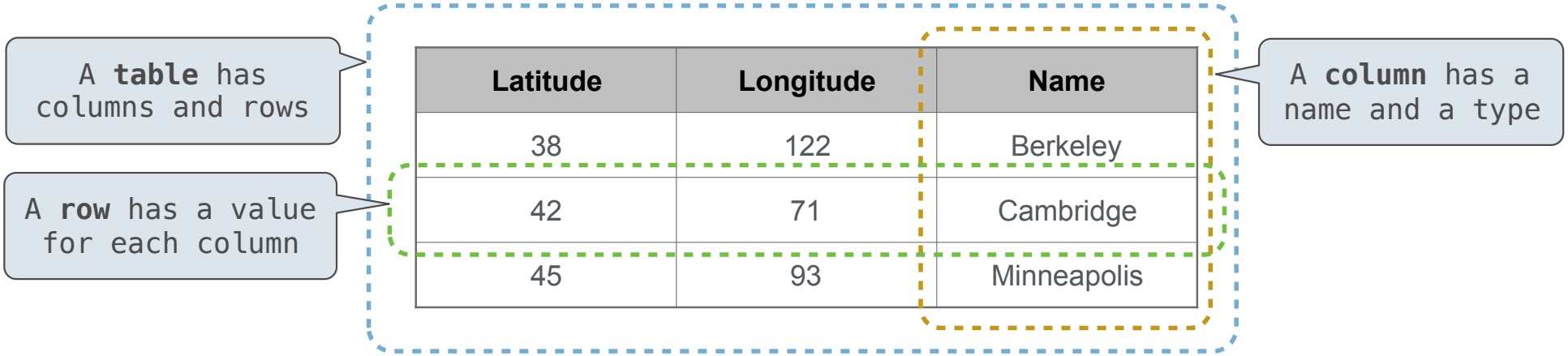

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SQL is a *declarative* programming language

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select "west coast" as region, name from cities where longitude >= 115 union
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Region	Name
west coast	Berkeley
other	Minneapolis
other	Cambridge

```
select "west coast" as region, name from cities where longitude >= 115 union
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Structured Query Language (SQL)

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Today's theme:

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Today's theme:

http://awhimsicalbohemian.typepad.com/.a/6a00e5538b84f3883301538dfa8f19970b-800wi

Getting Started with SQL

Install sqlite (version 3.8.3 or later): http://sqlite.org/download.html

Use sqlite online: http://kripken.github.io/sql.js/GUI/

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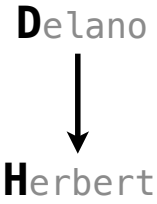

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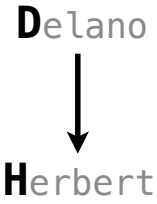

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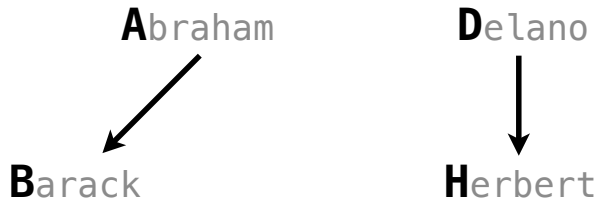

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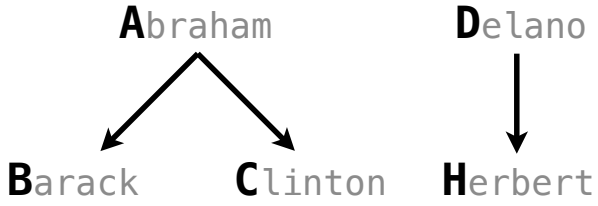

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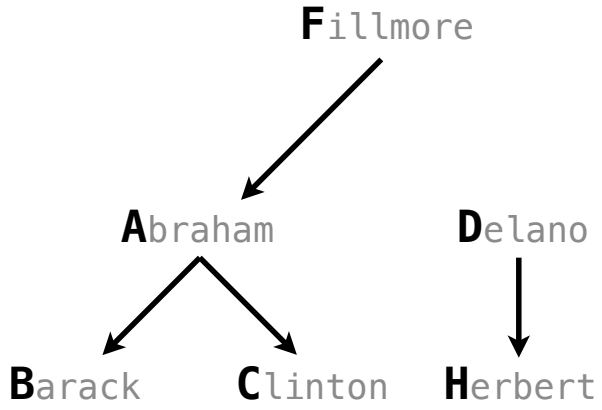

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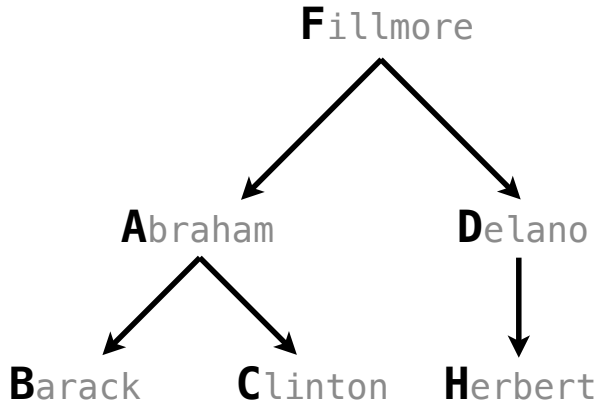

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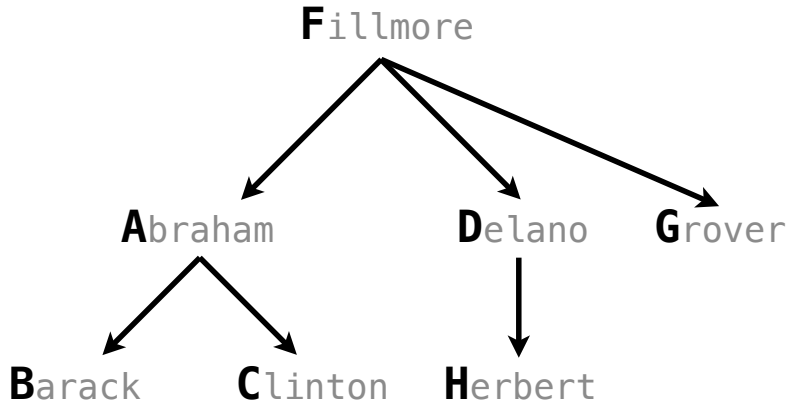

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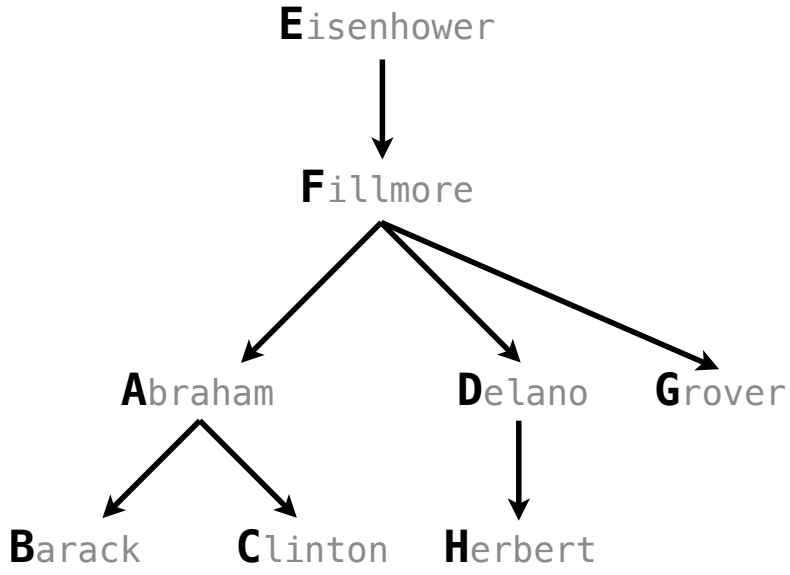

Naming Tables

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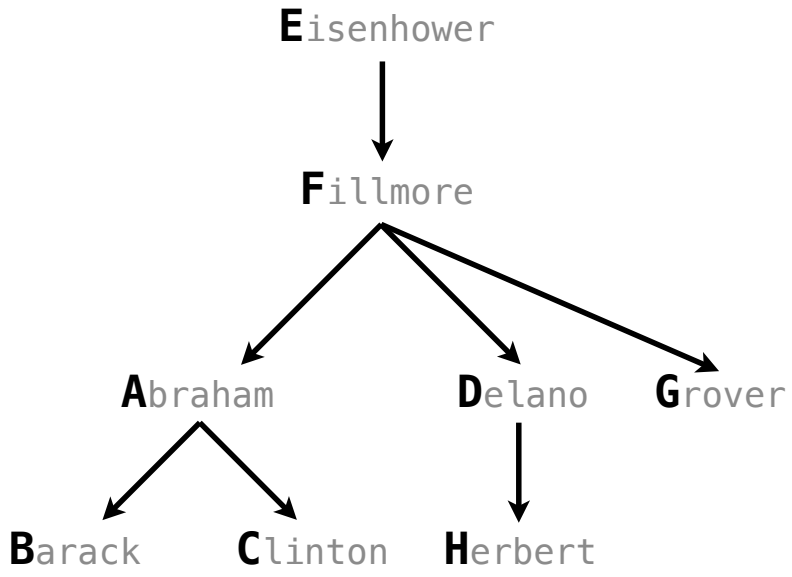

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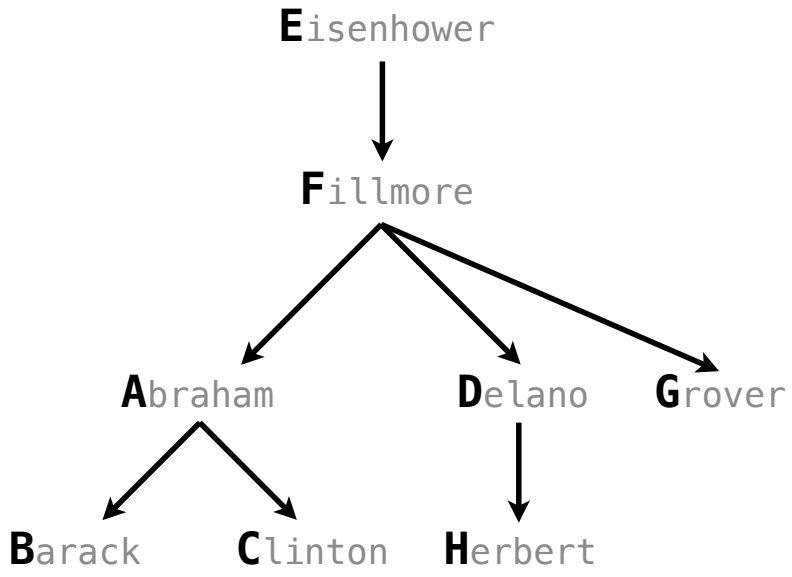

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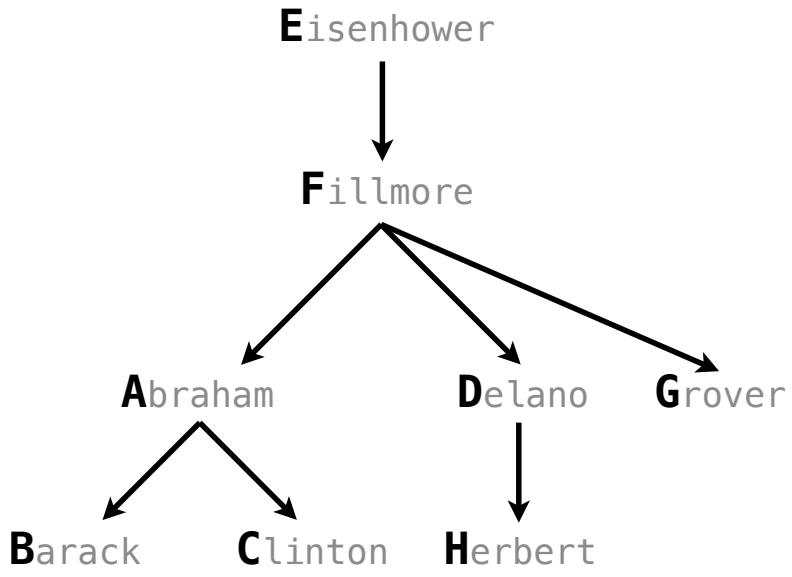

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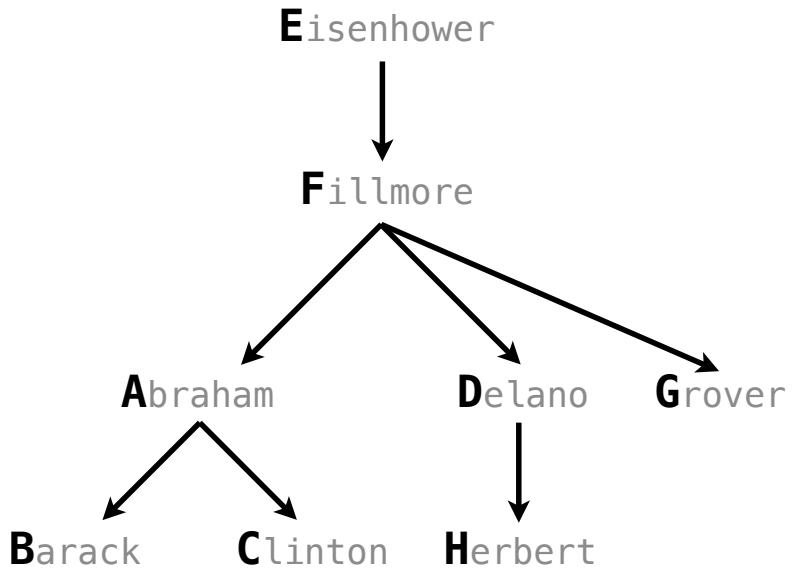

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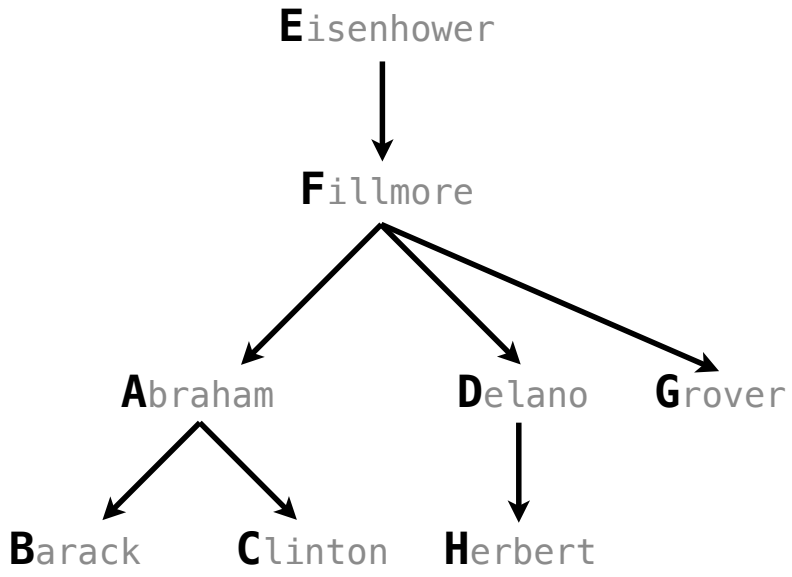

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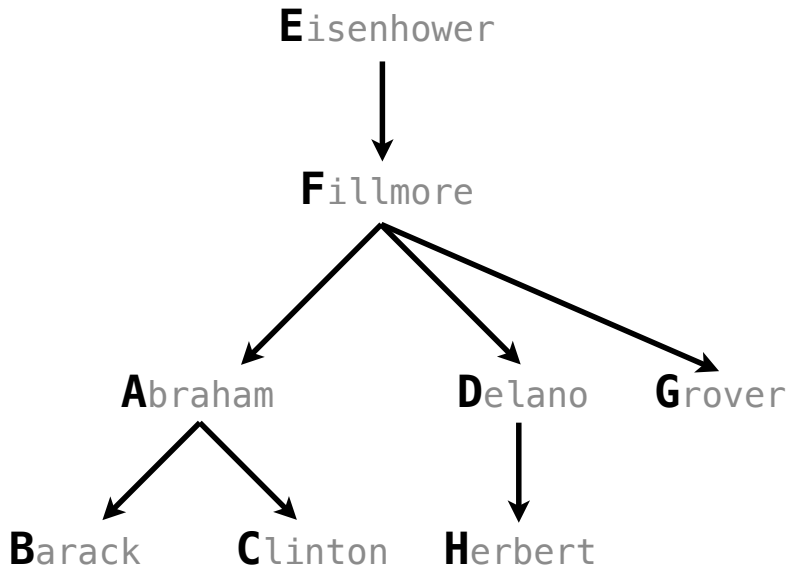

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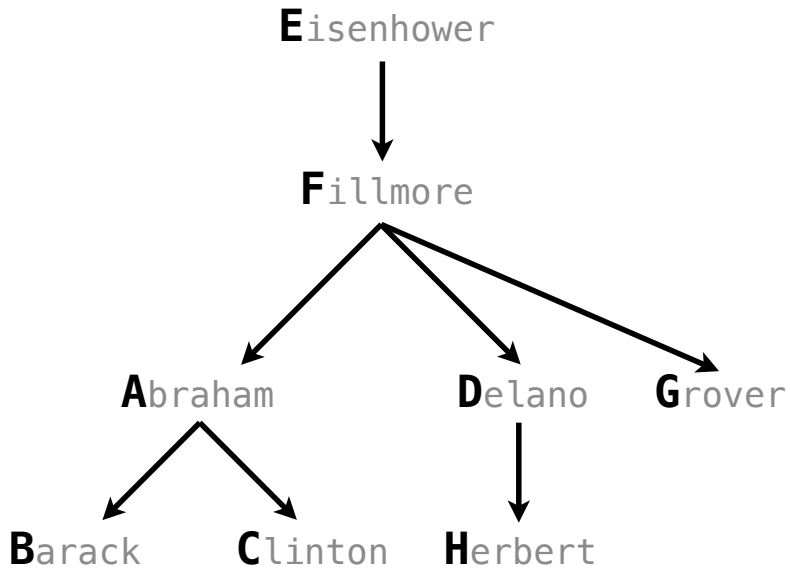

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Parents:

Parent	Child
abraham	barack
abraham	clinton
delano	herbert
fillmore	abraham
fillmore	delano
fillmore	grover
eisenhower	fillmore

Projecting Tables

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A **select** statement can specify an input table using a **from** clause

```
select [expression] as [name], [expression] as [name], ... ;
select [columns]                                           ;
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A subset of the rows of the input table can be selected using a **where** clause

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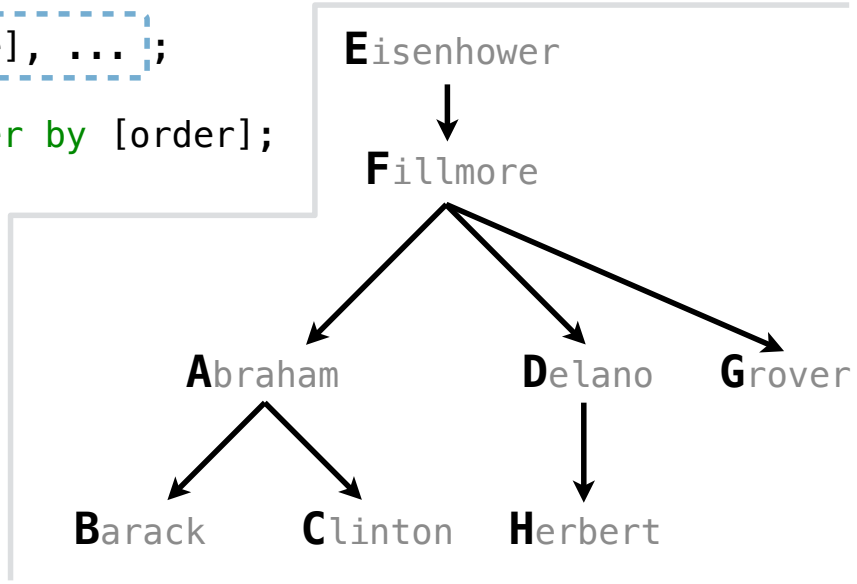

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select child from parents where parent = "abraham";
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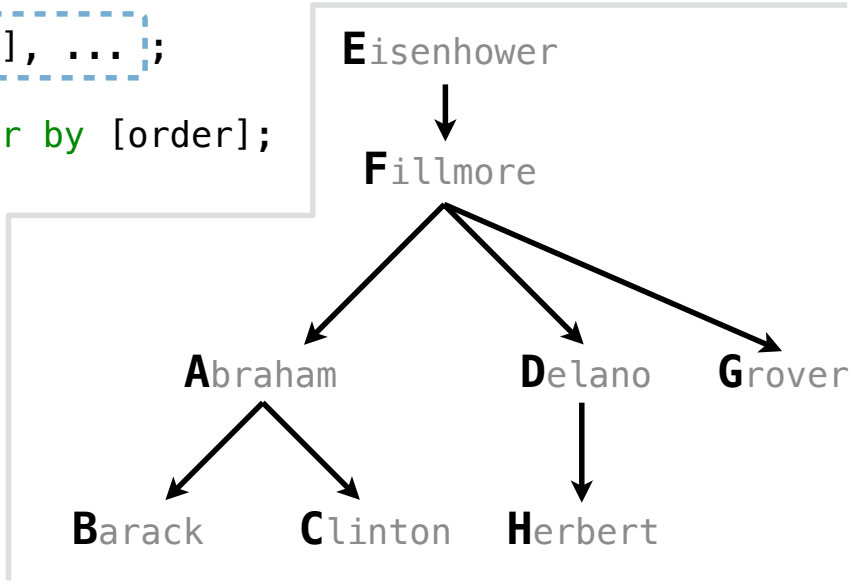

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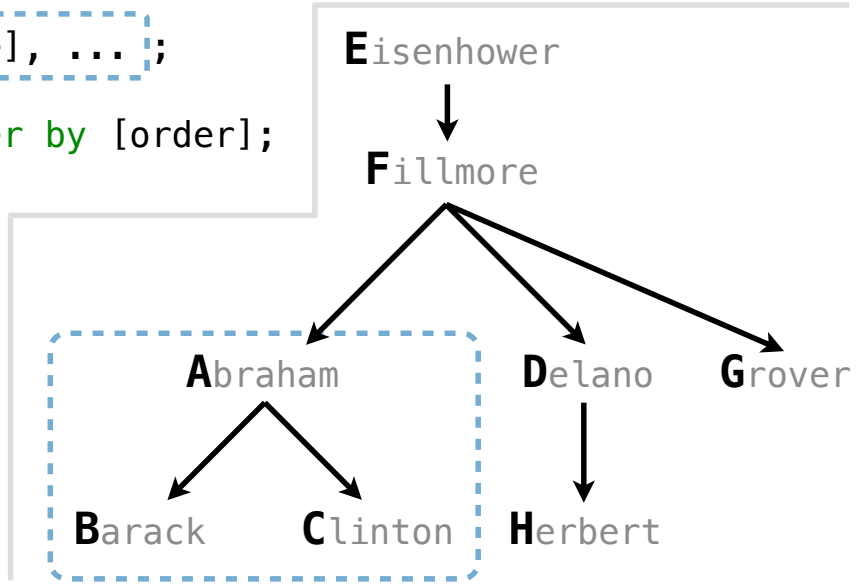

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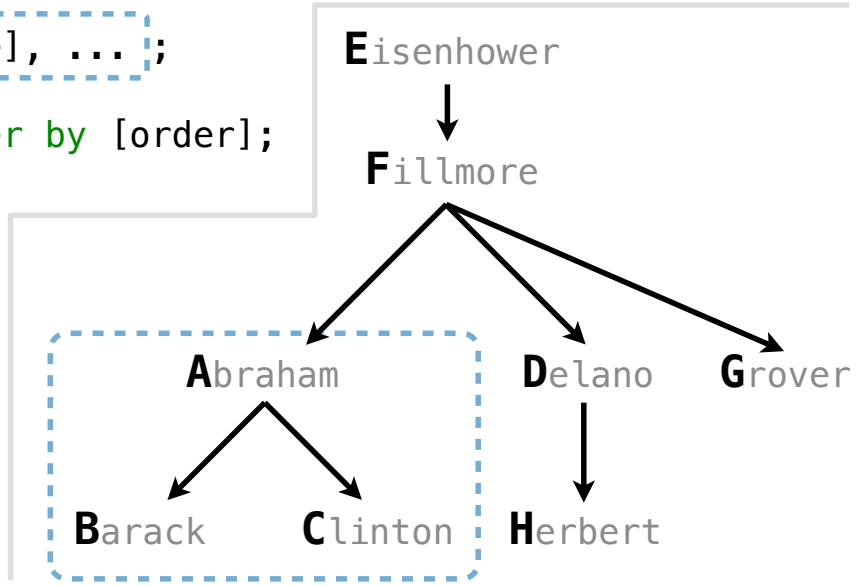
Child
barack
clinton



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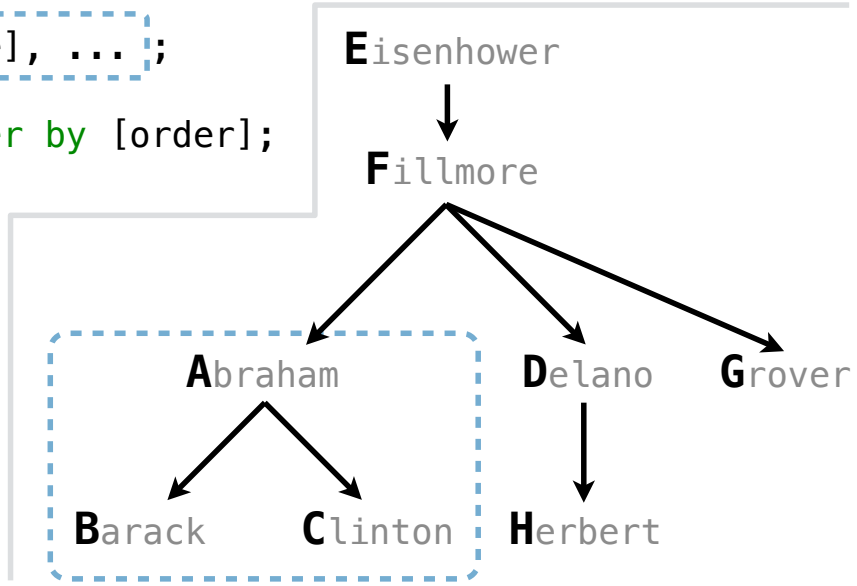

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Child
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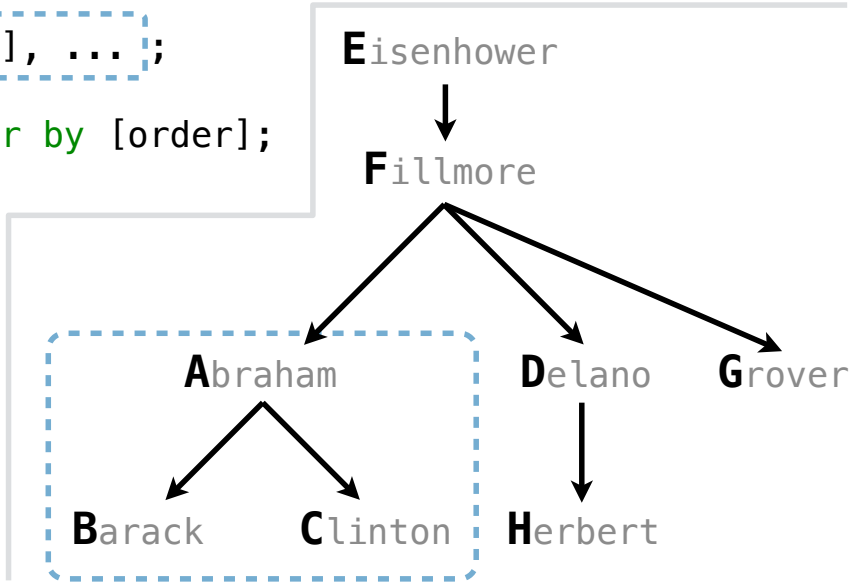
clinton

Parent
fillmore
fillmore



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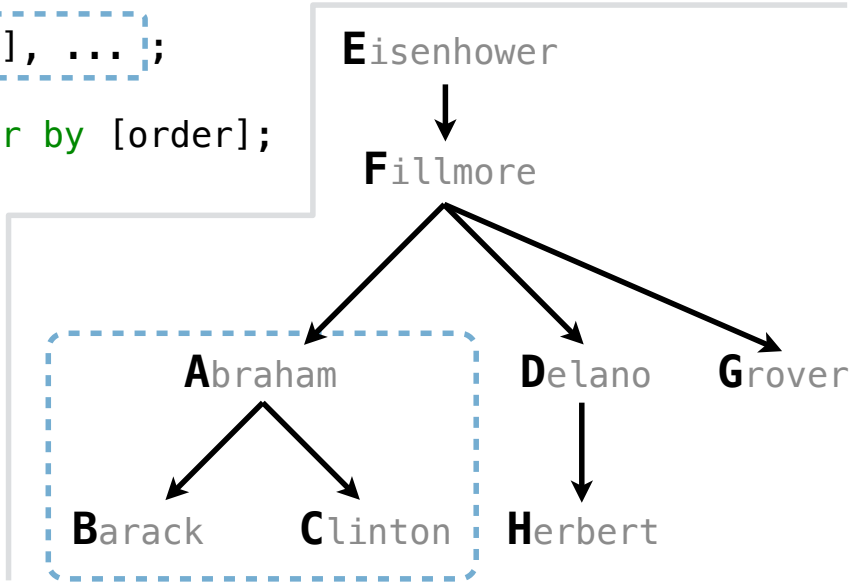
(Demo)



Arithmetic

Arithmetic in Select Expressions

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In a select expression, column names evaluate to row values

Arithmetic expressions can combine row values and constants

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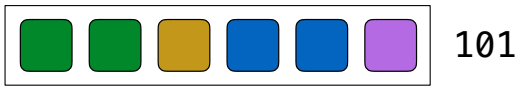

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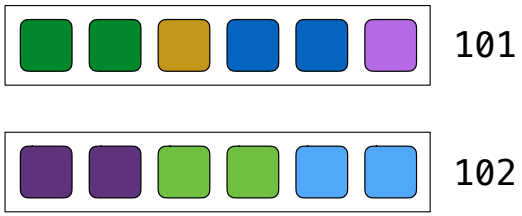

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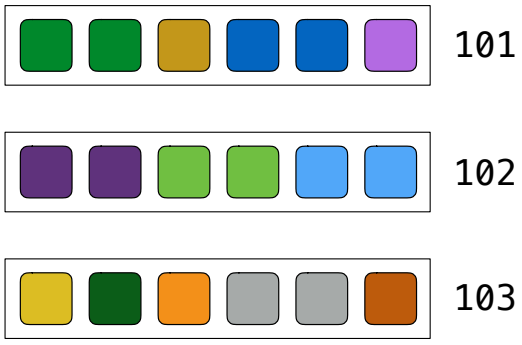

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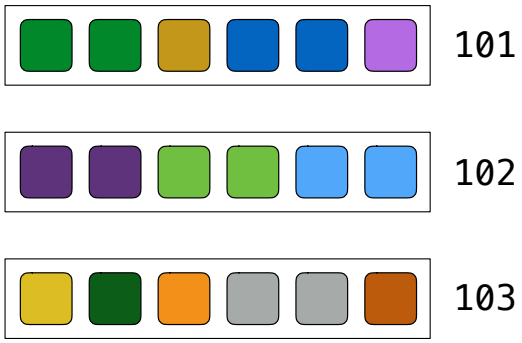
select chair, single + 2 * couple as total from lift;
```



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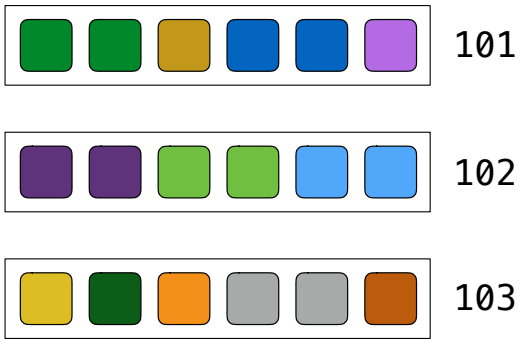
```

chair	total
101	6
102	6
103	6



Discussion Question

Given the table **ints** that describes how to sum powers of 2 to form various integers

```
create table ints as
  select "zero" as word, 0 as one, 0 as two, 0 as four, 0 as eight union
  select "one"         , 1       , 0       , 0        , 0          union
  select "two"         , 0       , 2       , 0        , 0          union
  select "three"       , 1       , 2       , 0        , 0          union
  select "four"        , 0       , 0       , 4        , 0          union
  select "five"        , 1       , 0       , 4        , 0          union
  select "six"         , 0       , 2       , 4        , 0          union
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(A) Write a select statement for a two-column table of the **word** and **value** for each integer

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...	...

(B) Write a select statement for the **word** names of the powers of two

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word
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two
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(Demo)

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one
two
four
eight

Prolog: Another Declarative Language
(a side excursion)

Prolog

Prolog is a *logic programming language* developed about 1972 by Alain Colmerauer et al.

Originally developed for computational linguistics and AI.

Programs consist of rules, which define relations, rather than functions.

```
succ(1, 2).
```

A simple fact: successor of 1 is 2

X and Y are logical variables

```
plus(X, 1, Z) :- succ(X, Z).
```

For any X and Z, X+1=Z if Z is successor of X.

Demo